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PSITHYRUS LABORIOSUS, AN UNWELCOME GUEST IN THE HIVES OF APIS MELLIFICA.¹

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In their comprehensive treatise on bee culture, A. I. and E. R. Root² discuss the various major and minor enemies of the hive-bee, including such insect pests as ants, wasps, and dragon flies. I should here like to call attention to another insect enemy which these authors do not mention.

Since the summer of 1922, I have kept from two to five colonies of hive-bees in connection with my work on bumblebees, and have very often found dead, or paralyzed, females of *Psithyrus*³ *laboriosus* in front of my hives. These dead, or dying, bees were usually more or less denuded of pile (*cf.* figs. 1 and 2), and in a few cases the antennae, wings, and tarsi were also badly mutilated. Furthermore, I have frequently noticed that the females of this *Psithyrus*, and occasionally also a queen or worker of some of the non-parasitic bumblebees, make determined attempts to enter the hives, even after they have been repeatedly repelled by the guards.⁴ These observations led me to conclude that the

¹ Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 282.

² The A B C and X Y Z of Bee Culture. The A. I. Root Company, Medina, Ohio, 1923.

³ A genus of bumblebees whose members are social parasites on various species of the genus *Bremus*, the industrious branch of the bumblebee family (*Bremidae*).

⁴ Dr. William M. Warren, Dean of the College of Liberal Arts, Boston University, informs me that he has made similar observations.

Psithyrus females had attempted to gain admittance to the hives, and that the guards had summarily "executed" them, without any serious sacrifice on their part. However, as will be seen later, I was mistaken in the last part of my assumption. Before going into this matter, it seems desirable, however, to give a brief account of the life-history and habits of these interesting social parasites.⁵

Both sexes of the genus *Psithyrus* so closely resemble those of the genus *Bremus* that anyone, other than a specialist, would see no difference between them. It is quite easy, however, to tell a *Bremus* from a *Psithyrus* female because the latter lacks corbiculæ, or pollen baskets. Having no apparatus for collecting pollen, the *Psithyrus* female is unable to found a colony of her own, but, like the European cuckoo and some of our American cowbirds, lays her eggs in the nests of her more industrious cousins. The latter rear the larvæ of this lazy guest, instead of their own, which are destroyed by the intruder.

That the *Psithyrus* female does not always gain admittance to a *Bremus* colony without a struggle is indicated by the frequent discovery in bumblebee nests of dead or disabled *Psithyri* or *Bremi*, and is confirmed by direct observation when a *Psithyrus* first enters, or is placed in, a *Bremus* nest. In these encounters, the *Psithyrus* has a great advantage over the members of the *Bremus* colony. She has a powerful sting, and her integument is so thick that her opponents are unable to penetrate it with their stings; but she is vulnerable in certain places—*e.g.*, the neck—and it is chiefly for this reason that she is not always successful. Thus on June 22, 1923, a female of *Psithyrus laboriosus* entered one of my nest-boxes containing a colony of *Bremus terricola*, she herself and fifteen workers being killed during the ensuing battle. Two weeks later this same colony was visited by another *Psithyrus laboriosus* female, and this encounter likewise resulted in the death of the intruder and more than a dozen workers.

What takes place during such an encounter is illustrated by some experiments which I performed several years ago by placing a female of *Psithyrus laboriosus* or *Psithyrus ashtoni* in a large colony of *Bremus impatiens*. As soon as the *Psithyrus* was introduced a great uproar arose in the colony. The workers rushed

⁵ For a more detailed account of the life-history and habits of our American *Psithyri*, *cf.* Plath: Notes on *Psithyrus*, with Records of Two New American Hosts. Biol. Bull., Vol. 43 (1922).

madly in every direction searching for the source of the disturbance. The *Psithyrus* was seized almost immediately by numerous workers who tried to sting her, and was thus made absolutely helpless. A few bellicose workers, unable to get hold of the intruder, seized some of their fellows in the struggling mass, and attempted to sting toward the center. On one occasion such a fighting mass was lifted out of the nest-box with a pair of forceps, and when the workers finally released their hold, it was found that the ball had consisted of seventeen workers and the *Psithyrus*. The latter and four of the workers were severely stung and died within a short time. Although the *Psithyrus* female made vigorous attempts during the struggle to sting her adversaries, one of the four workers was stung to death by another worker at the periphery of the mass, and it is possible that the other three may have met death in the same way. This treatment of *Psithyrus laboriosus* by a colony of *Bremus impatiens* is similar to the behavior of a colony of hive-bees toward a newly-introduced queen. Such an attack, usually known as "balling," is described as follows by the Roots: "Very often when the bees decide they will not accept the queen let loose among them they will begin to pull at her, pile on her in such numbers that they form a ball around her. Every bee in the ball will seem intent on pulling her limb from limb. Unless the owner comes to her rescue she may be stung to death or suffocated." To this account I may add that on one occasion I found a large number of dead, or dying, workers on the floor of one of my hives, and I am of the opinion that most, if not all, were killed by the workers on the periphery of the large ball which had formed about the newly-introduced queen.

However, as will be seen from the following incident, a battle between *Bremus* workers and a *Psithyrus* may have quite a different ending. On July 24, 1921, nineteen workers of a colony of *Bremus impatiens*, which had been transferred to one of the Bussey buildings on the preceding day, were caught at the old nest site and placed in a glass jar. A few minutes later a female of *Psithyrus laboriosus* was discovered on some comb which had been left in the empty nest cavity of a colony of *Bremus fervidus*. Just to see what would happen, the *Psithyrus* was also placed in the jar. All of the inmates, including the *Psithyrus*, were ill at ease and tried to escape, but one or two of the workers nevertheless attacked the *Psithyrus* as soon as they came in contact with her. The latter now went on the warpath herself. She quickly

seized one worker after another, whether attacked by them or not, rolled them below her abdomen and stung them to death. This done, she seemed to feel quite at home in the jar, and began to lap up the honey which was oozing from the bodies of her victims. From what has been said before, it is evident that this encounter might have ended quite differently if it had taken place in a bumblebee nest.

It will now be interesting to know what happens when a *Psithyrus* enters a hive containing a strong colony of *Apis mellifica*. In the early afternoon of July 2, 1925, I visited my two hives, No. 1 containing a medium-sized colony of three-banded Italians, and No. 2, a strong colony of Carniolans. I noticed several workers, with their abdomens curved below the body, hurriedly crawling out, and away from the entrance of hive No. 2. From previous observations I knew that these individuals had been stung. This led me to suspect that the colony was giving battle to a *Psithyrus*, a surmise which was corroborated a few seconds later, when a female of *Psithyrus laboriosus*, with about a dozen workers of *Apis mellifica* clinging to her legs, antennæ and wings, came slowly crawling out of the entrance. In trying to throw off her enemies, the *Psithyrus* lost her footing, and more bees joined the fray as she began to struggle with her assailants. As in the case of *Bremus impatiens*, those workers which were unable to get

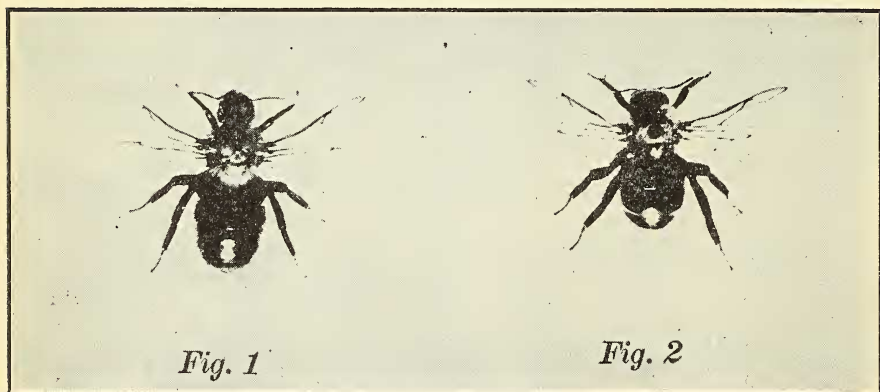


Fig. 1. Normal female of *Psithyrus laboriosus*. Natural size.
Fig. 2. Female of *Psithyrus laboriosus* killed by a colony of *Apis mellifica*. Natural size. As will be noticed, the workers have denuded the intruder of most of her pile.

hold of the intruder seized one of the workers clinging to the Psithyrus, and in this way a ball, about two inches in diameter, was formed. After a few seconds the ball fell from the alighting board to the ground—a distance of about three inches—and the resulting jar caused many of the bees to release their hold. However, a considerable number refused to let go of the intruder until several minutes later, when the Psithyrus had become so paralyzed that she was no longer able to crawl. This was also true of four of her adversaries, while about a dozen others were only partially paralyzed. Several of these were placed in a box, but all died within a short time.

From these observations it is evident that wherever *Psithyrus laboriosus*, or other members of this genus are common, they must be considered as a minor enemy of the hive-bee.

COLLECTING NOTES ON EUREMA LISA (BDV. & LEC.) IN THE VICINITY OF FALL RIVER, MASSACHUSETTS.

BY WM. PRESCOTT ROGERS.

October 14, 1920.—A fresh male in opening of cut over Woodland at extension of Robeson St. (Dr. E. T. Learned.)

September 21, 1921.—Fresh male in open field off Bell Rock Road flying about fall dandelion and goldenrod.

October 16, 1921.—One female and two males in fair to good condition on fall dandelion near 14th tee of the Rhode Island Country Club, Nyatt, R. I.

October 20, 1921.—A fresh male in front yard of Border City Mfg. Co., Fall River, Mass.

October 30, 1921.—A male in good condition taken on fall dandelion on the lawn of Mr. Charles H. Durfee's estate, Tiverton, R. I.

September 10, 1922.—Fresh male on old 3d green of the Duxbury, Mass., Golf Club.

September 1, 1924.—Two fresh males on fall dandelion on 13th fairway of Rhode Island Country Club, Nyatt, R. I.

July 10, 1926.—Fresh male taken on the 6th fairway of the Fall River Country Club.

This latter capture is first *lisa* taken in our vicinity in any year previous to September, despite constant search. We should be interested to hear whether other Massachusetts lepidopterists ever find this species in abundance north of Fall River.